

a plurality of motors respectively associated with said multiple axes, each of said motors providing relative movement between the tool and the workpiece along an associated one of said axes;

a plurality of feedback devices respectively associated with said plurality of motors for providing feedback information indicative of at least one of the actual position and velocity of the tool along an associated axis; and

a single computational resource for controlling said data defining means and said data converting means, for receiving feedback information from each of said feedback devices, and for controlling the operation of each of said motors to provide coordinated relative movement between the tool and the workpiece along each of said multiple axes in accordance with said stored path description.

4. (Amended) A method for providing coordinated movement of a device along multiple axes of motion by means of a single computational resource, comprising the steps of:

a) determining desired movement of the device along each of said axes of motion for successive increments of time;

b) carrying out one cycle of control for one of said increments of time, said cycle including the steps of:

i) determining, on the basis of said desired movement, at least one of a desired position and desired velocity of the device along one of said axes;

- ii) detecting at least one of the actual position and actual velocity of the device along said one axis;
- iii) calculating at least one of a position error and a velocity error along said one axis for said increment of time;
- iv) generating a pulse-width modulated control signal to produce movement along said one axis that is effective to reduce said error by:
- determining a center value indicative of the average width of the pulse-width modulated signal over plural previous cycles of operation;
- computing a response based on said error and detecting whether said response is less than or greater than a reference value;
- increasing said center value when said response is greater than said reference value and decreasing said center value when said response is less than said reference value; and
- summing said center value and said response to determine the width of said pulse-width modulated signal; and
- v) sequentially repeating steps i, ii and iii for each of the other axes; and
- c) repeating step b for each of the successive increments of time.

Cancel claims 5 and 6.

11. (Amended) A method for [generating] controlling a cutting tool to generate a geometric design in a block of formable material [tangible form], comprising the steps of:

parametrically representing the design along respective axes for successive units of measure, where each axis corresponds to a dimension of the design;

for each axis, determining the coefficients of a polynomial which describes at least a portion of the parametric representation;

for each axis, computing from said coefficients recursive values for at least position and change of position per unit of measure;

storing said recursive values in a table;

recursively summing the stored values for successive units of measure to compute new position values; and

[representing] moving the tool to locations determined by each of the position values along the respective axes to thereby remove some of the material at said locations and provide [in] a tangible [media] representation of said design.

Cancel claim 14.

Claim 15, line 1, delete "14" and insert --11--.

Cancel claims 16 and 17.

Add the following new claims:

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1-18. The system of claim 3 wherein said data comprises a sequence of operations which define said geometric shape, and said data converting means processes said sequence of operations to produce a table that describes the movement of the tool along each axis, relative to the workpiece, for each cycle of operation.

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19. The system of claim 1 wherein said data defining means includes a user interface by means of which a user communicates with said single ~~computational resource~~ ^{active processor} to define and/or modify geometric shapes, and wherein said single ~~computational resource~~ ^{active processor} stores said data in response to communications received from a user through said user interface.

20. A method for producing a multi-axial, tangible representation of a geometric shape in a medium, comprising the steps of:

- establishing a geometric shape to be represented;
- defining a parametric representation of each axial component of the geometric shape for successive units of measure;
- for each axial component, determining and storing recursive values for position and change of position per unit of measure which describe at least a portion of the parametric representation;
- recursively summing the stored values to compute successive position values; and

controlling a device, which produces a tangible representation in said medium, in accordance with said successive position values to thereby generate said geometric shapes in said medium.

21. The method of claim 20 wherein said device is a cutting tool which moves relative to a block of formable material along axes of motion that correspond to the axial components of the geometric shape, and said controlling step includes moving said device along said axes to successive locations corresponding to said successive position values.

22. The method of claim 21 wherein said units of measure comprise units of time.

23. The method of claim 20 wherein said device comprises a display screen comprised of pixels and said controlling step includes changing the display values of pixels whose locations correspond to said position values, to provide a visible representation of the geometric shape on the screen.--

REMARKS

In response to the Office Action dated April 27, 1992, Applicant respectfully requests reconsideration and withdrawal of the rejections of the claims and objections to the disclosure.